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GB 500482
GB 443320
GB 284427
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F2E
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(54) A pad type drum brake

(57) The brake comprises a pair of brake shoe bodies (1) formed of a web alone, without a rim, with at least one recess portion (2) on its outer periphery and a respective friction pad (3) comprising a friction material (3*b*) to be engaged with a brake drum and a backing plate (3a) adhered to the friction material (3b) inserted into each recess portion (2), the friction pads (3) being detachably fixed by pad clips (5). The number and arrangement of the friction pads provided on the outer periphery of the brake shoe body (1) is appropriately selected according to the loads received by the brake shoe bodies (1) during braking e.g. in the duo-servo brake of Figure 3 or in the leading-trailing brake of Figure 4. The recess portions (2) are shown rectangular although the bottom portions thereof may be curved (Figures 5, 6). The friction material (3*b*) may have convex surface, and radius of curvature thereof may be slightly smaller than that of drum.

FIG.1

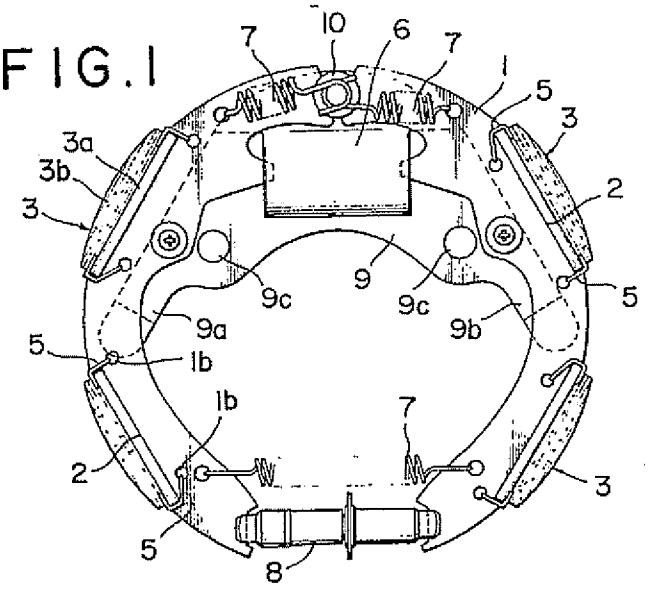

FIG.10

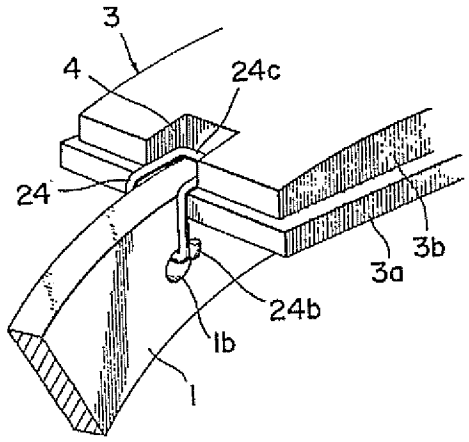

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FIG.1

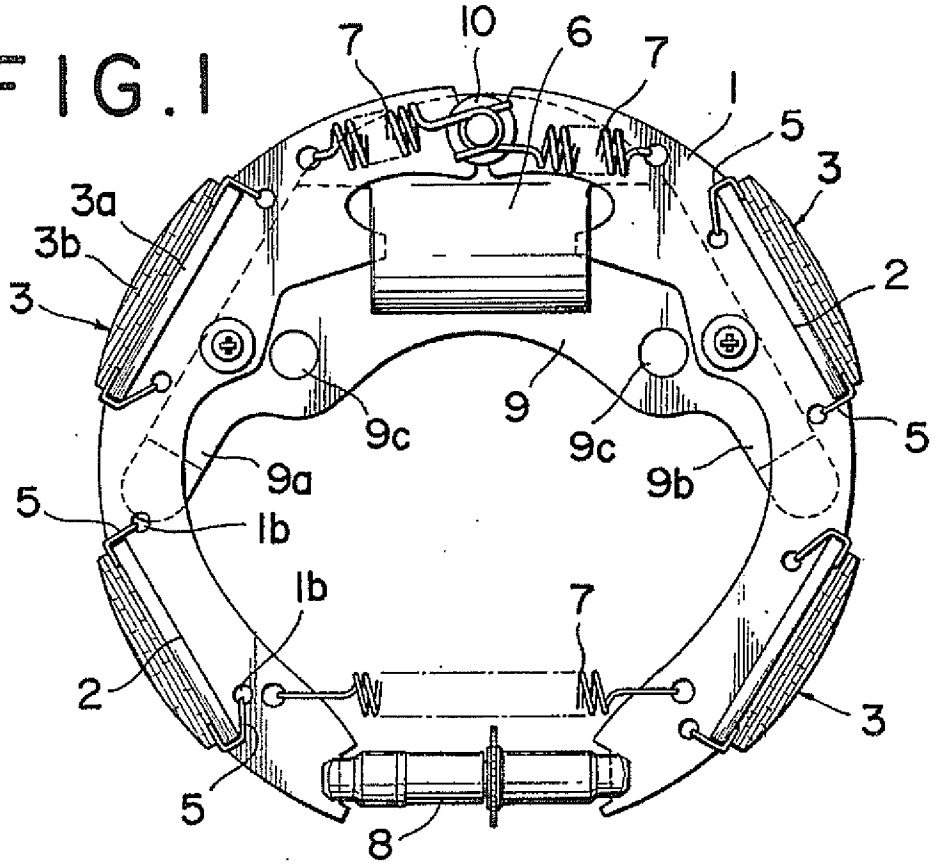

FIG.2

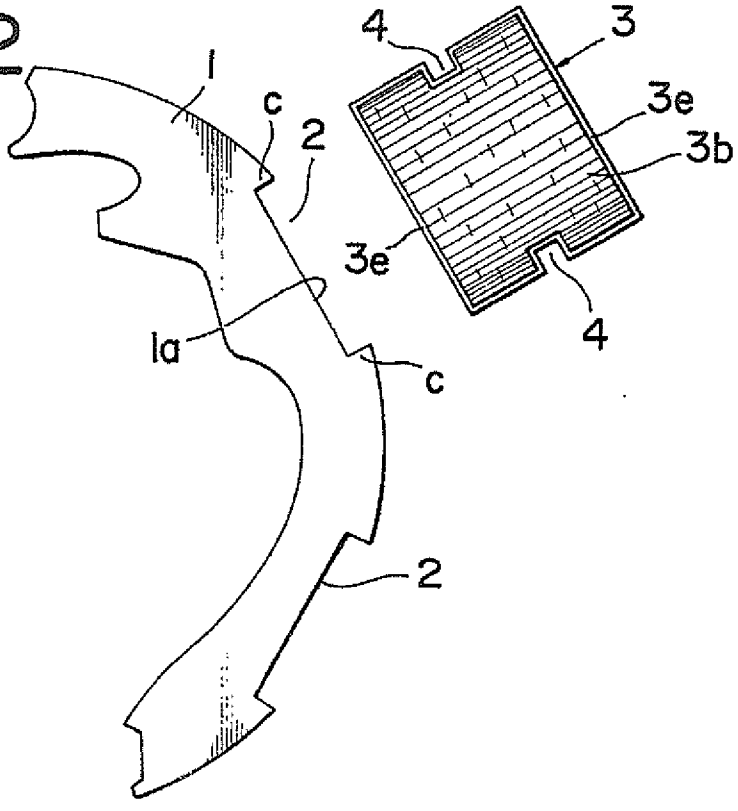

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FIG. 3

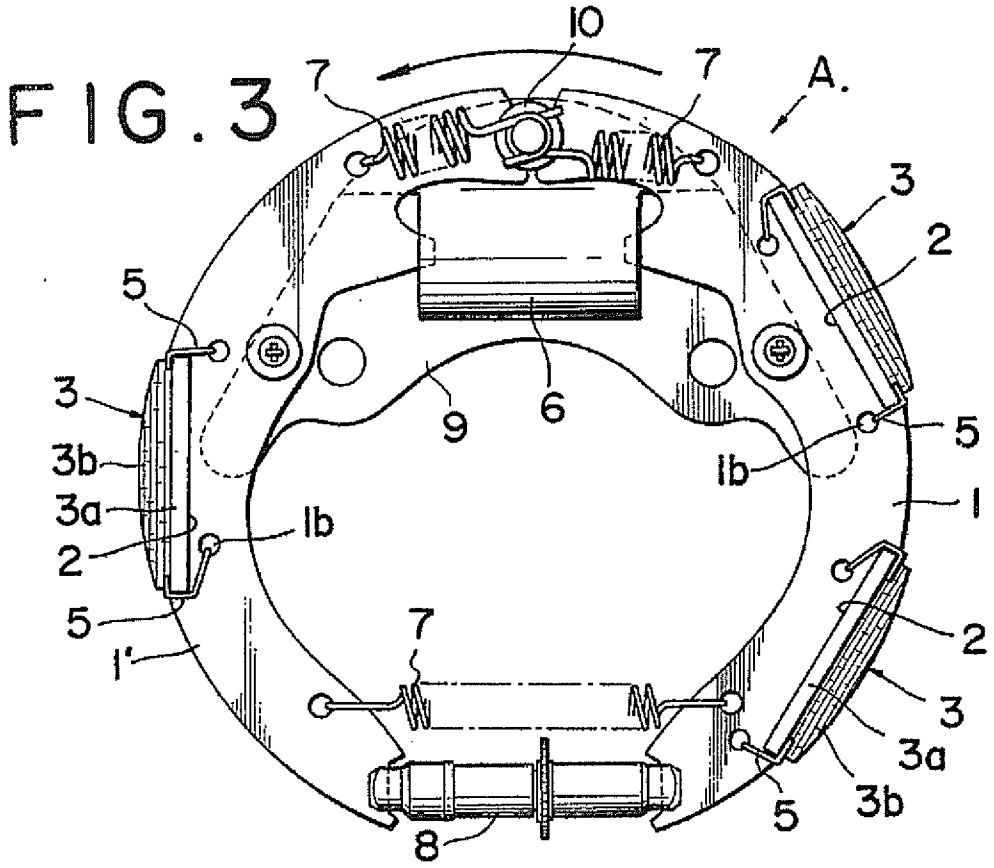

FIG. 4

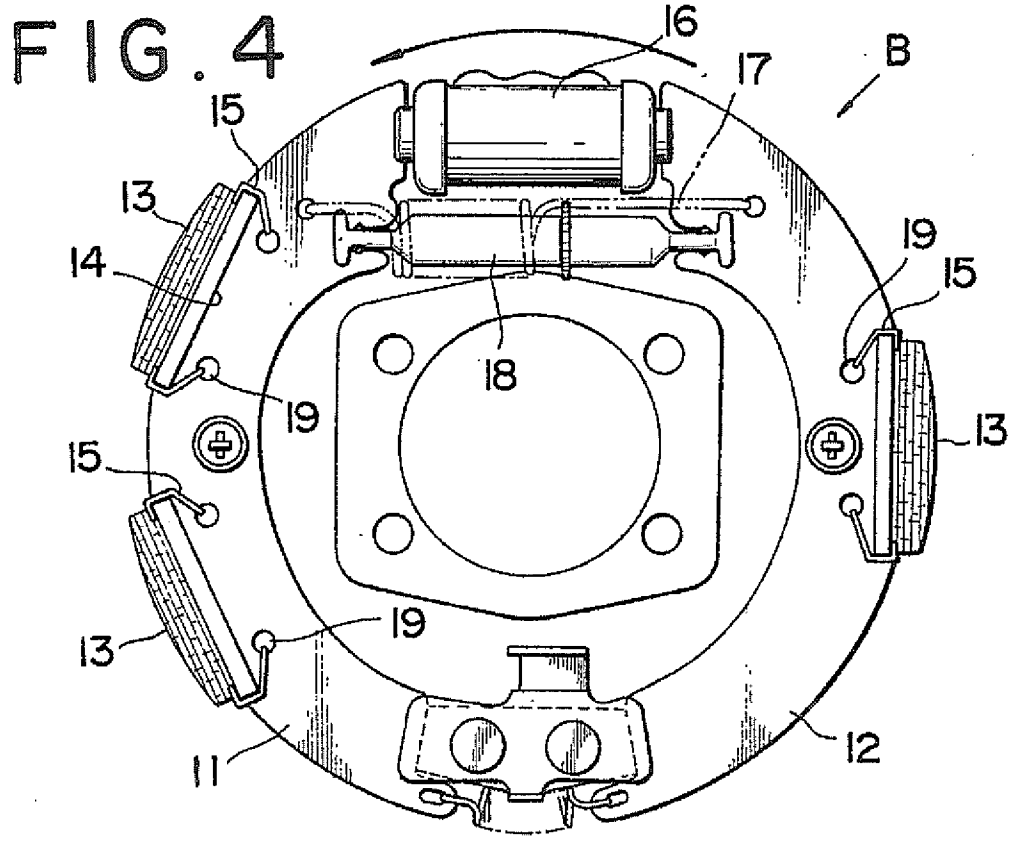

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FIG.5

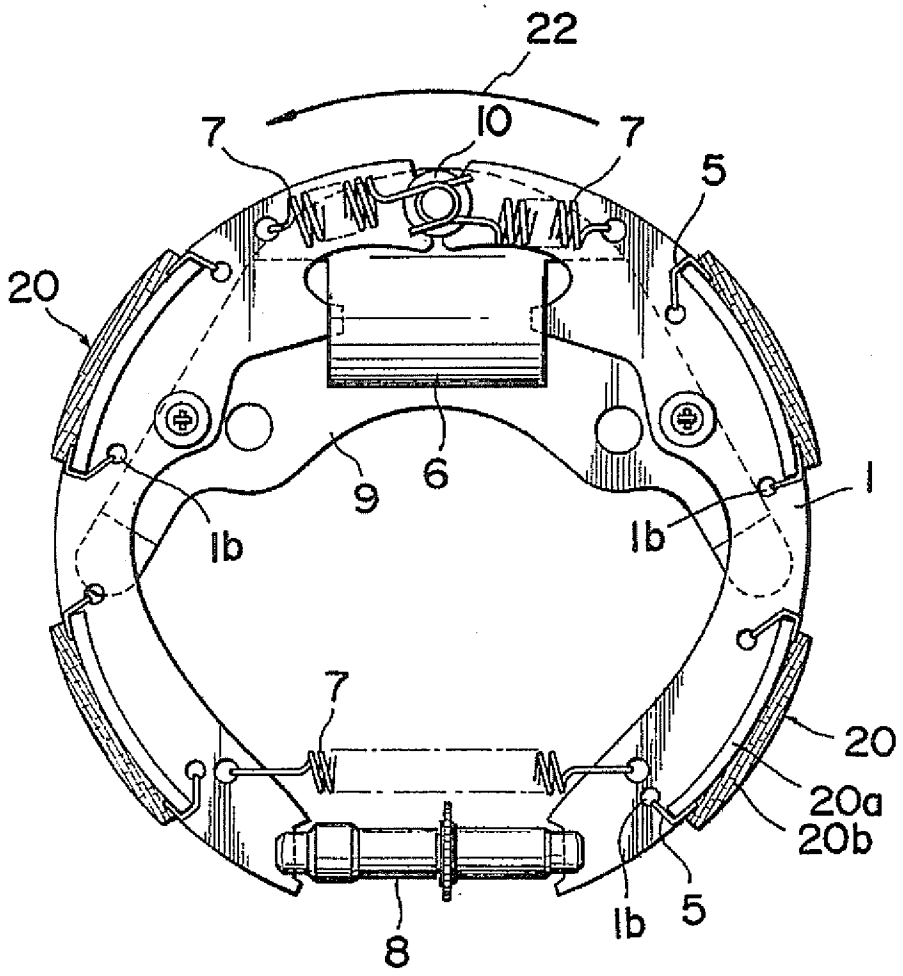

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FIG.6

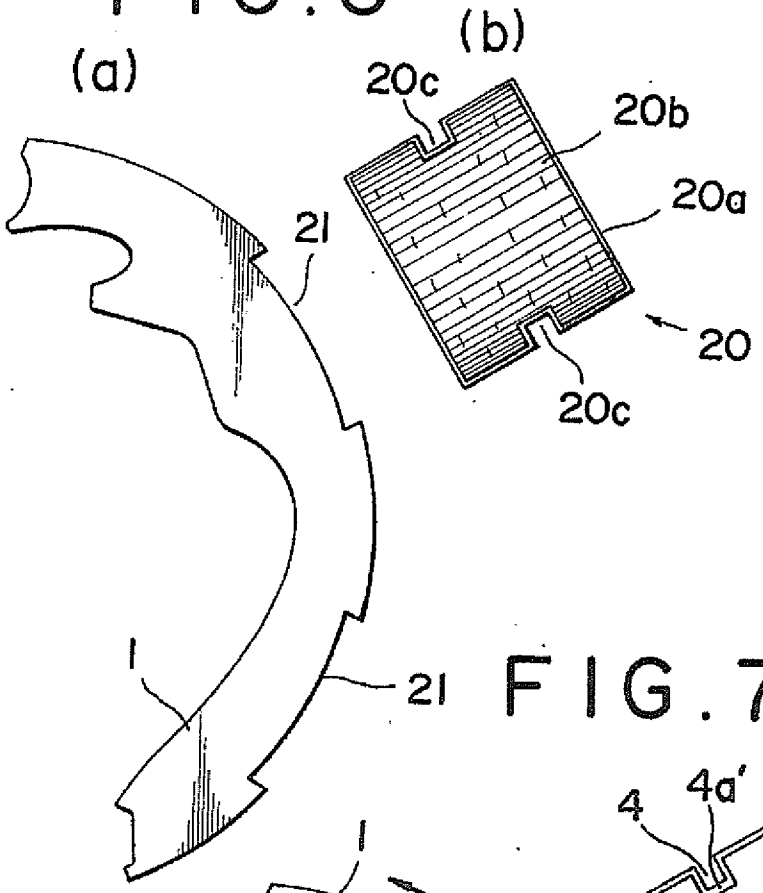

FIG.7

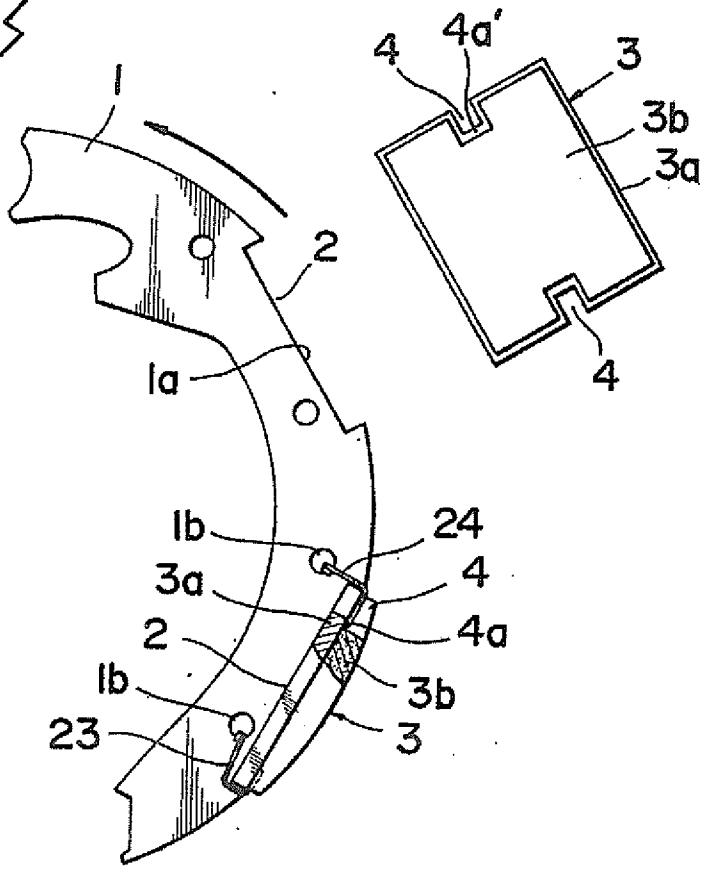

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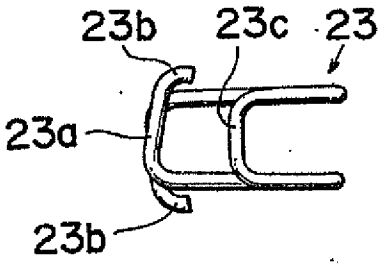
FIG. 8



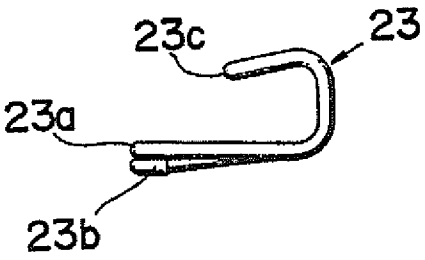
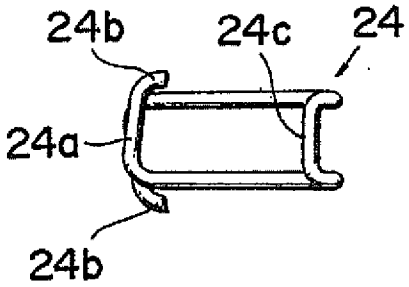


FIG. 9



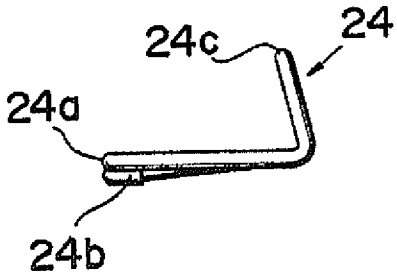
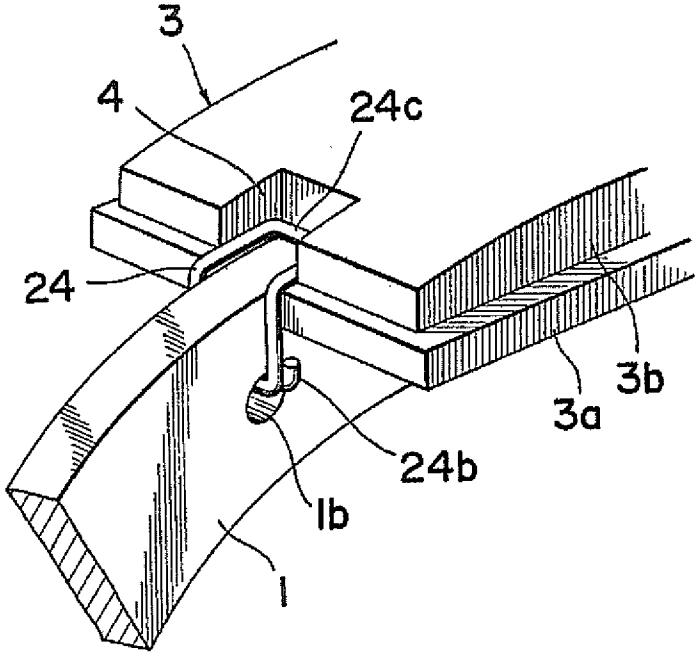


FIG. 10



SPECIFICATION

A pad type drum brake

The present invention relates to a pad type drum brake in which a brake shoe body and a friction pad are separately formed and the brake shoe body is formed of a web alone, so that assembly and disassembly of the brake shoe body and the friction pad are quite simple.

The inventors have previously developed a cassette type brake shoe (Japanese Patent Laid-open No. 86930/80) in which the friction pad of the brake shoe is formed separately from the brake shoe body and arranged free in assembly and disassembly of the friction pad to the brake shoe body, namely in an arrangement such that the pad type brake lining is inserted and engaged with the brake shoe body toward the axis of the brake drum.

An object of the present invention is to provide an improvement of the above arrangement.

According to the invention there is provided a pad type drum brake comprising a plurality of brake shoe bodies each being provided with at least one recess portion on an outer periphery thereof opposite to the inner surface of a brake drum, an actuating means for pressing the brake shoe bodies toward the inner surface of the brake drum, a friction pad placed into each recess portion each comprising a friction material to be frictionally engaged with the brake drum and a backing plate adhered to the friction material, and a plurality of pad clips for detachably fixing the friction pads to the brake shoe bodies.

Preferably the brake shoe body is formed of a web alone without a rim and is provided with one or more than two recess portions on an outer periphery thereof, and each friction pad is provided with concave grooves at both sides thereof such that the friction pad may be inserted in a radial direction of the brake drum and engaged with the outer periphery of the brake shoe body by virtue of the concave grooves and the recess portion mentioned above, and the engagement of the friction pad to the brake shoe body confines the movements of the friction pad in axial and rotational directions of the drum. Furthermore, pad clips, made of resilient wire for example, connect the friction pad and the brake shoe body to thereby confine the movements of the friction pad in radial and rotational directions of the brake drum.

Accordingly, since the lining of the drum brake is formed in a pad separated from the brake shoe body, the exchange of the lining along is both possible and easy, and the brake shoe body consisting of a web alone without a rim makes the construction simpler and reduces its weight.

Further, the assembly and disassembly of the friction pad are carried out by removing the pad clips only and therefore the efficiency of exchanging the friction materials is remarkably enhanced.

Furthermore, according to the experiments of the inventors, in the pad type drum brake of this invention, a pad type lining of low coefficient of friction provides a sufficient brake effectiveness and a stable brake function, and therefore a semi-metallic pad of low coefficient of friction is usable to obtain a stable brake effectiveness.

Accordingly, the present invention provides the advantage of realizing the utility of the non-asbestos friction material recently demanded due to considerations of environmental pollution.

Furthermore, in the application of the present invention, a plurality of the friction pads are advantageously set along the outer periphery of the brake shoe body separately with the spaces between the friction pads which are particularly effective against the heat and water fadings of the friction pads.

Furthermore, the friction pad comprises a plane backing plate and a friction material provided with a convex surface is formed on the backing plate. When the curvature of the convex surface for the friction material is set slightly smaller than that of the brake drum to be braked, a desired brake friction surface of the friction material is advantageously formed in the course of the braking operations.

Further details and advantages of the invention will be apparent from the following description of embodiments of the invention, with reference to the accompanying drawings, wherein:

Fig. 1 is a general plan view of a pad type drum brake without a brake drum in a first embodiment of the present invention.

Fig. 2 is an exploded view illustrating the connection between a brake shoe body and a friction pad in Fig. 1.

Fig. 3 is a plan view of a duo-servo type drum brake in a second embodiment of the pad type drum brake of this invention.

Fig. 4 is a plan view of a leading and trailing type drum brake in a third embodiment of this invention.

Fig. 5 is a plan view of a drum brake of a fourth embodiment of this invention.

Fig. 6 is an exploded view of a brake shoe body and a friction pad in the fourth embodiment.

Figs. 7—10 show modified examples of a pad clip in the fifth embodiment of this invention.

Fig. 1 shows the pad type drum brake of the first embodiment which includes right and left brake shoe bodies 1 assembled into a brake drum (not shown), each brake body being formed of a web alone without a rim, namely, a circular sheet metal.

As shown in Fig. 2, a plurality of rectangular recess portions 2 are provided along the outer periphery of the brake shoe body 1 with a space between the respective recess portions. Two recess portions 2 are shown in the drawing but the number of the recess portion is not limited to two.

A friction pad 3 to be engaged with the recess portion 2 comprises a plain backing plate 3a and a convex friction material 3b joined to the backing plate 3a, and is provided with concave grooves 4 at both sides thereof located at an approximately

central portion of each side.

Further, as mentioned above, the radius of curvature for the convex surface of the friction material is set slightly smaller than that of the brake drum to be braked.

When the friction pad 3 is inserted into the recess portion 2, bottom portions of the concave grooves 4 of the friction 3 engage with front and rear portions c of the brake shoe body 1 so that the friction pad 3 is engaged with the brake shoe body 1 in the rotational, axial and central directions of the brake drum.

A pad clip 5 is of a resilient material and is made from bending a wire rod. In an example shown in Fig. 1, one end of each pad clip 5 is inserted into one of a pair of holes 1b provided near the recess portion 2 of the brake shoe body 1, and then other end of each pad clip 5 is engaged with both sides of one end of an edge portion 3e of the friction pad 3 at front, rear or upper sides thereof so that the backing plate 3a is pressed at front or rear and upper sides thereof and the friction material 3b is held between right and left sides of the friction pad 3 so as to prevent a rattling of the friction pad 3 in radial and rotational directions of the brake drum.

In Fig. 1, numeral 6 represents a wheel cylinder for moving one end of right and left brake shoe bodies 1 to apply a braking force to an inner surface of a brake drum, numerals 7 represent return springs for restoring the brake shoe bodies 1 and numeral 8 represents an adjusting means connecting the other ends of the pair brake shoe bodies 1 for adjusting the clearance between the friction pads 3 and the brake drum.

A support member 9 is provided with a pair of anchor portions 9a and 9b, an anchor pin 10 which engages with respective ends of the brake shoe bodies 1 to receive a braking force, and the wheel cylinder 6. The support member 9 is fixed to a non-rotational member of the vehicle through fitting holes 9c. The wheel cylinder 6 is provided with a pair of pistons (not shown) therein, each piston engaging with one of the brake shoe bodies 1.

The drum brake shown in Fig. 1 is a duo-servo type drum brake, the operation of which is known in the art and therefore will not be described. On a bottom portion 1a of the recess portion 2 shown in Fig. 2, the friction pad 3 is arranged to slant. Accordingly, if the brake drum is deformed during braking, the friction pad 3 slants according to the deformation of the brake drum so as to prevent a specific portion of the friction material 3b engaging with the brake drum and avoid an uneven wear of the friction material 3b, thus obtaining a uniform wear.

Figs. 3 and 4 show second and third embodiments of the present invention. The object of these embodiments is to provide a pad type drum brake in which friction pads are arranged on the outer peripheries of the brake shoe bodies according to the loads received by the respective brake shoe bodies during braking, so that different loads are provided for by the different friction areas of the friction pads, and thus, on average, each friction pad arranged on the brake shoe bodies receives a similar load and amount of wear.

Figs. 3 and 4 respectively show a duo-servo type drum brake and a leading and trailing type drum brake. Components which are the same as those in the previous embodiment are referred to by the same reference numerals. The arrows shown in the figures indicate the rotational direction of the brake drum (not shown).

In the duo-servo type drum brake of Fig. 3, since a secondary shoe body 1 on the right side receives a larger load than a primary shoe body 1' on the left side, two and one friction pads 3 are respectively provided on the outer peripheries of the secondary and primary shoe bodies 1 and 1', thus adjusting the friction areas to the loads.

In the leading and trailing drum brake B of Fig. 4, since a leading shoe body 11 receives a larger load than a trailing shoe body 12, two and one friction pads 13 are respectively provided on the outer peripheries of the leading and trailing shoe bodies 11 and 12, thus adjusting the friction areas to the loads.

The friction pads 13 are engaged with recess portions concavely provided on the outer peripheries of the shoe bodies 11 and 12 as in the previous example and are fixed to the shoe bodies 11 and 12 by pad clips 15 made of resilient steel.

Further, in Fig. 4, the numeral 16 indicates a wheel cylinder for expanding a pair of the shoe bodies 11 and 12, and the numerals 17, 18 and 19 are respectively a return spring, an adjusting means and a hole for retaining the pad clip 15.

In the above two embodiments, one piece or two pieces of the friction pad is or are used for each brake shoe body, but the number of the friction pads is not restricted to these numbers of pieces. The number of the friction pads is rather appropriately selected according to the loads during braking of the drum brake under the conditions of properties, shapes, etc. of the friction material.

Figs. 5 and 6(a) and (b) show the fourth embodiment. The friction pad of the embodiment comprises a backing plate and a friction material (lining portion), both of which include a curved surface corresponding to the cylindrical surface of the brake drum (not shown). The parts which are the same as in the previous embodiments are referred to by the same reference numerals.

As shown in Figs. 5 and 6, the drum brake is composed of right and left brake shoe bodies 1 and a plurality of friction pads 20. In other words, the brake shoe body 1 is composed of a web alone without the conventional rim and is formed with an outer periphery of an arcuate shape corresponding to the cylindrical surface of the brake drum (not shown) and provided with a plurality of recess portions 21 of the same arcuate shape for setting friction pads 20 therein, as shown in Fig. 6(a). The reference numeral 22 indicates the rotational direction of the brake drum in a forward movement.

On the other hand, the friction pad 20 comprises a curved backing plate 20a corresponding to the cylindrical surface of the brake drum and a friction material 20b of the same curved shape, both parts being adhered together to form the friction pad 20.

The friction pad 20 is provided with a pair of concave grooves 20c at central portions of both sides thereof. The friction pads 20 are fixed to the brake shoe body 1 through the concave grooves 20c by the pad clips 5.

In the above arrangement of the curved backing plate 20a, the friction material 20b wears evenly with efficient effect and is economical compared to the plain backing plate.

Figs. 7—10 show the fifth embodiment of this invention which mainly relates to a modification of the pad clip. The friction pad 3 of Fig. 7 is fixed to the brake shoe body 1 by a pad clip 23 of Fig. 8 at one end by a pad clip 24 of Fig. 9 at other end.

The pad clips 23 and 24 are made of a wire rod of resilient material and both ends 23a of the pad clip 23 or both ends of the pad clip 24 are arranged to overlap each other in an approximately rectangular shape. The pad clip 23 is bent in a horizontal lengthwise direction in an U shape as shown in Fig. 8 and the pad clip 24 is bent in a horizontal lengthwise direction in a L shape as shown in Fig. 9. Edge portions at both ends of the pad clip 23 or 24 are bent inwardly to form hook portions 23b or 24b for hooking into a hole 1b of the brake shoe body 1.

As shown in Fig. 10, the fitting of the pad clip 24 is carried out so that an intermediate short edge portion 24c is engaged with a border portion 4a' of the concave groove 4 of the friction pad 3 and then the hook portions 24b are separated and positioned around the brake shoe body 1 so as to be inserted into the hole 1b provided near the recess portion 2 of the brake shoe body 1, thus resiliently holding the friction pad 3 to the brake shoe body 1. The fitting of the pad clip 23 is carried out in a similar manner.

Since the pad clips 23 and 24 resiliently hold the friction pad 3 as mentioned above, those pad clips 23 and 24 not only control a movement of the friction pad 3 in radial and rotational directions of the brake drum but also prevent a rattling of the friction pad 3 owing to vibrations, etc. during braking and the friction material being dragged by the brake drum during brake release.

CLAIMS

1. A pad type drum brake comprising a plurality of brake shoe bodies each being provided with at least one recess portion on an outer periphery thereof opposite to the inner surface of a brake drum, an actuating means for pressing the brake shoe bodies toward the inner surface of the brake drum, a friction pad placed into each recess portion each comprising a friction material to be frictionally engaged with the brake drum and a backing plate adhered to the friction material, and a plurality of pad clips for detachably fixing the friction pads to the brake shoe bodies.

2. A pad type drum brake according to claim 1, wherein each recess portion is of a rectangular shape and the backing plate of each friction pad is plane.

3. A pad type drum brake according to claim 1 or 2, wherein a plurality of friction pads is provided on at least one of the brake shoe bodies.

4. A pad type drum brake according to any preceding claim, wherein each brake shoe body is in a plane plate and each friction pad slants on a bottom portion of each recess portion.

5. A pad type drum brake according to any preceding claim, wherein the friction material of each friction pad has a curved surface the radius of curvature of which is smaller than that of the inner surface of the brake drum.

6. A pad type drum brake according to any preceding claim, wherein the backing plate of each friction pad is provided with concave grooves at both sides thereof in a circumferential direction of the brake drum which engage with the brake shoe body.

7. A pad type drum brake according to any preceding claim, wherein there are a pair of brake shoe bodies receiving different loads during braking, the brake shoe body receiving the larger load being provided with more friction pads than that receiving the smaller load.

8. A pad type drum brake according to claim 7, wherein the brake shoe body receiving the larger load is provided with two friction pads and the brake shoe body receiving the smaller load is provided with one friction pad.

9. A pad type drum brake according to claim 1, wherein a bottom portion of each recess portion is formed in a curved shape and each friction pad is formed in a curved shape corresponding to said bottom portion.

10. A pad type drum brake according to any preceding claim, wherein the pad clips are provided at both sides of each friction pad in a circumferential direction of the brake drum so as to resiliently connect the brake shoe bodies and the friction pads.

11. A pad type drum brake according to claim 10, wherein each pad clip is formed from a piece of a wire rod of a resilient material.

12. A pad type drum brake according to claim 11, wherein an intermediate portion of each pad clip is engaged with the backing plate of each friction pad and edge portions at both ends of each pad clip are hooked into a respective hole provided on the brake shoe body so as to clip the brake shoe body.

13. A pad type drum brake substantially as herein described with reference to the accompanying drawings.

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